

# Technical Information

## *Carbon Mass Balance Test Summaries*

Tests show minimum fuel improvements and reduction in emissions (particulate smoke reduction)



Distributed By: Syntek Global Inc.  
12382 South Gateway Park Place Suite B800  
Draper, UT 84020  
801-386-5007



## ***Xtreme Fuel Treatment Fuel Catalyst Case Study FK001 Road Train Tractor Test***

### **Test Method:**

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The procedures utilized to measure the fuel consumption of two (2) 2003 and two (2) 2005 Peterbilt tractors with C-15 Caterpillar engines, is an adaptation of the US-EPA Federal Test Procedures (FTP) and the Australian Standards engineering method AS2077-1982 known as the carbon mass balance. The method measures the fuel consumed by each engine while operating under steady-state or static engine conditions. The Bacharach True Spot Smoke meter was used to determine the change in particulate emissions (soot).

The second method, or validation test, required data accumulated from the onboard E-cat system, which monitored fuel consumption, idle time, drive speed, load, and other pertinent data necessary to monitor fuel consumption accurately.

### **Test Results:**

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The combined test fleet realized a 6.9% improvement in engine fuel efficiency with the Carbon Mass Balance evaluation and an 8.5% improvement in engine fuel efficiency utilizing the onboard computerized E-cat data, after Xtreme Fuel Treatment. The same engines experienced a 26% reduction in particulate density (smoke reduction) with similar reductions in all other harmful emissions.



## ***Xtreme Fuel Treatment Fuel Catalyst Case Study FK002 Over-the-Road Tractor Test***

### **Test Method:**

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The procedure utilized to measure the fuel consumption of three (3) 2004 Peterbilt tractors with C-15 Caterpillar engines, is an adaptation of the US-EPA Federal Test Procedures (FTP) and the Australian Standards engineering method AS2077-1982 known as the Carbon Mass Balance. The method measures the fuel consumed by each engine while operating under steady-state or static engine conditions. The Bacharach True Spot Smoke meter was used to determine the change in particulate emissions (soot).

### **Test Results:**

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The combined test fleet realized a 5.5% improvement in engine fuel efficiency with the Carbon Mass Balance evaluation, after Xtreme Fuel Treatment fuel borne catalyst. The same engines experienced a 25% reduction in particulate density (smoke reduction) with similar reductions in all other harmful emissions.



**Stack observation  
No. 5 Bunker fuel oil (untreated)**



**Stack observation  
No. 5 Bunker fuel oil (treated)**



**Stack observation  
No. 6 Bunker fuel oil (treated)**



**Stack observation  
No. 6 Bunker fuel oil (untreated)**

## ***Xtreme Fuel Treatment Fuel Catalyst Case Study FK003 Stationary Power Generation Test***

### **Test Method:**

The procedure utilized to measure the fuel consumption of this MANN B&W Power Generation set is an adaptation of the US-EPA Federal Test Procedures (FTP) and the Australian Standards engineering method AS2077-1982 known as the Carbon Mass Balance. The method measures the fuel consumed by the engine while operating under steady-state conditions. The Bacharach True Spot Smoke meter was used to determine the change in particulate emissions (soot).

### **Test Results:**

The generator set realized a 5.2% improvement in engine fuel efficiency with the Carbon Mass Balance evaluation, after Xtreme Fuel Treatment fuel borne catalyst treatment. The same engine experienced a 39% reduction in particulate density (smoke reduction) with similar reductions in all other harmful emissions. A concurrent study was conducted by an additional independent contractor that substantiated emissions reductions with Xtreme Fuel Treatment fuel catalyst.



## ***Xtreme Fuel Treatment Fuel Catalyst Case Study FK004 Haul Truck Test***

### **Test Method:**

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The procedure used to measure the fuel consumption in four (4) 777C Caterpillar haul trucks, is an adaptation of the US-EPA Federal Test Procedures (FTP) and the Australian Standards engineering method AS2077-1982 known as the Carbon Mass Balance evaluation. The method measures the fuel consumed by each engine while operating under steady-state or static engine conditions. The Bacharach True Spot Smoke meter was used to determine the change in particulate emissions (soot). Concurrently, an in-house fuel study was conducted to determine fuel consumption improvements based on daily fuel, weight, and hour meter records.

### **Test Results:**

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The combined fleet test realized a 7.5% improvement in engine efficiency, with the Carbon Mass Balance procedure, and a 9% improvement in engine fuel efficiency, with the in-house fuel study, after Xtreme Fuel Treatment fuel borne catalyst. The same engines experienced a 28% reduction in particulate density (smoke reduction), with similar reductions in other harmful emissions.



## ***Xtreme Fuel Treatment Fuel Catalyst Case Study FK005 Loader Test***

### **Test Method:**

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The procedure used to measure the fuel consumption in this 992C Caterpillar loader, is an adaptation of the US-EPA Federal Test Procedures (FTP), and the Australian Standards engineering method AS2077-1982 known as the Carbon Mass Balance evaluation. The method measures the fuel consumed by the engine while operating under steady-state or static engine conditions. The Bacharach True Spot Smoke meter was used to determine the change in particulate emissions (soot).

### **Test Results:**

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This test unit realized a 7% improvement in engine efficiency, with the Carbon Mass Balance procedure, after Xtreme Fuel Treatment fuel borne catalyst. The same engine experienced a 27% reduction in particulate density (smoke reduction), with similar reductions in other harmful emissions.



## ***Xtreme Fuel Treatment Fuel Catalyst Case Study FK006 Crawler Test***

### **Test Method:**

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The procedure used to measure the fuel consumption in this D10R Caterpillar crawler, is an adaptation of the US-EPA Federal Test Procedures (FTP) and the Australian Standards engineering method AS2077-1982 known as the Carbon Mass Balance evaluation. The method measures the fuel consumed by the engine while operating under steady-state or static engine conditions. The Bacharach True Spot Smoke meter was used to determine the change in particulate emissions (soot).

### **Test Results:**

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This test unit realized a 6.5% improvement in engine efficiency, with the Carbon Mass Balance procedure, after Xtreme Fuel Treatment fuel borne catalyst. The same engine experienced a 25% reduction in particulate density (smoke reduction), with similar reductions in other harmful emissions levels.



## ***Xtreme Fuel Treatment Fuel Catalyst Case Study FK007 Haul Truck Test***

### **Test Method:**

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The procedure used to measure the fuel consumption in this Rimpull 150 ton coal hauler, is an adaptation of the US-EPA Federal Test Procedures (FTP) and the Australian Standards engineering method AS2077-1982 known as the Carbon Mass Balance evaluation. The method measures the fuel consumed by the engine while operating under steady-state or static engine conditions. The Bacharach True Spot Smoke meter was used to determine the change in particulate emissions (soot). Concurrently, an in-house fuel study was conducted to determine fuel consumption improvements based on daily fuel, weight, and hour meter records.

### **Test Results:**

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This equipment test realized a 6.6% improvement in engine efficiency, with the Carbon Mass Balance procedure, and a 7.1% improvement in engine fuel efficiency, with the in-house fuel study, after Xtreme Fuel Treatment fuel borne catalyst. The same engine experienced a 30% reduction in particulate density (smoke reduction), with similar reductions in other harmful emissions levels.



## ***Xtreme Fuel Treatment Fuel Catalyst Case Study FK008 Shovel Test***

### **Test Method:**

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The procedure used to measure the fuel consumption in this O&K 120-C shovel, is an adaptation of the US-EPA Federal Test Procedures (FTP) and the Australian Standards engineering method AS2077-1982 known as the Carbon Mass Balance evaluation. The method measures the fuel consumed by the engine operating under steady-state or static engine conditions. The Bacharach True Spot Smoke meter was used to determine the change in particulate emissions (soot).

### **Test Results:**

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This test unit realized a **7.4% improvement in engine efficiency**, with the Carbon Mass Balance procedure, after Xtreme Fuel Treatment fuel borne catalyst. The same engine experienced a 28% reduction in particulate density (smoke reduction), with similar reductions in other harmful exhaust emissions.



## ***Xtreme Fuel Treatment Fuel Catalyst Case Study FK009 Locomotive Test***

### **Test Method:**

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The procedure used to measure the fuel consumption in this EMD 645 locomotive engine, is an adaptation of the US-EPA Federal Test Procedures (FTP) and the Australian Standards engineering method AS2077-1982 known as the Carbon Mass Balance evaluation. The method measures the fuel consumed by the engine, while connected to a load box, operating under steady-state engine conditions. The Bacharach True Spot Smoke meter was used to determine the change in particulate emissions (soot).

### **Test Results:**

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This test unit realized a **7.2% improvement in engine efficiency**, with the Carbon Mass Balance procedure, after Xtreme Fuel Treatment fuel borne catalyst. The same engine experienced a **30% reduction in particulate density (smoke reduction)**, with similar reductions in other harmful exhaust emissions.